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Differences in the Social Networks of African American Men Who Have Sex With Men Only and Those Who Have Sex With Men and Women

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Abstract

Objectives—We compared social network characteristics of African American men who have sex with men only (MSMO) with social network characteristics of African American men who have sex with men and women (MSMW).

Methods—Study participants were 234 African American men who have sex with men who completed a baseline social network assessment for a pilot behavioral HIV prevention intervention in Baltimore, Maryland, from 2006 through 2009. We surveyed the men to elicit the characteristics of their social networks, and we used logistic regression models to assess differences in network characteristics.

Results—MSMO were significantly more likely than were MSMW to be HIV-positive (52% vs 31%). We found no differences between MSMO and MSMW in the size of kin networks or emotional and material support networks. MSMW had denser sexual networks, reported more concurrent and exchange partners, used condoms with more sexual partners, and reported interaction with a larger number of sexual partners at least once a week.

Conclusions—Although there were many similarities in the social and sexual network characteristics of MSMO and MSMW, differences did exist. HIV prevention interventions should address the unique needs of African American MSMW.

Recent epidemiological data suggest that the highest rates of HIV infection in the United States are found among African American men who have sex with men (MSM).[1] According to the National HIV Behavioral Surveillance survey in 2004–2005, among 5 cities studied, Baltimore, Maryland, had the highest HIV rates among African American MSM, with a prevalence of 51% and an estimated incidence rate of 8% per year.[2] African American MSM

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The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Contributors

C. Latkin and K. Tobin conceptualized and designed the study. C. Yang analyzed the data. C. Latkin, K. Tobin, and C. Yang wrote the initial draft of the article. T. Penniman, P. Spikes, and J. Patterson assisted with conceptualizing the study and writing the article. All authors reviewed and approved the final draft of the article.

Human Participant Protection

All study protocols were approved by the institutional review board of Johns Hopkins Bloomberg School of Public Health.

are also more likely than are MSM of other racial/ethnic groups to report bisexual identity.[3–9]

Some studies have focused on men who have sex with men and women (MSMW) as a potential bridge group to heterosexual transmission.[10,11] Several investigators have found that MSMW have lower HIV rates than do men who have sex with men only (MSMO).[11–13] Some studies have found that MSMW report more sexual partners than do MSMO,[11,14] although another has found that not to be true.[15]

Social network factors have been linked to transmission of HIV and other sexually transmitted infections.[16–18] Indeed, there is evidence that network structural characteristics, such as network density (the extent to which social network members know one another) and partner concurrency, may lead to high rates of sexually transmitted infectious diseases.[19–21] Network dynamics have also been used to explain the greater burden of HIV and AIDS among African Americans compared with other racial groups in the United States.[22] Network characteristics such as network size, composition, and density have been found to be associated with HIV risk behaviors, such as sharing injection equipment,[23–27] having multiple partners, engaging in unprotected sex, and exchanging sex for money or drugs.[28–31]

Social network analysis is a useful method to assess amounts, types, and sources of emotional and instrumental social support[32] without assuming that social support is derived from specific role relationships, such as spouse, co-worker, main sexual partner, or friend. In different populations, specific role relationships may not exist, or the same role may provide different types of social support. Few studies have examined the social networks of MSM,[33,34] and there is even less information on the social networks of African American MSM. Miller et al.[35] conducted in-depth interviews with 21 African American MSM and inquired about the composition of their social networks. They found that African American MSM listed twice as many non-MSM male friends as MSM friends. Few listed MSM friends with whom they did not have sex. A study of HIV-positive men and women reported that African American MSM received more social support from friends and health care providers than they did from family members.[36] It has been suggested that some African American MSM perceive that their community consists of their social network members rather than a physical location.[37]

We examined differences in social network composition between African American MSMO and African American MSMW. Examining social network composition is critical not only for assessing the dynamics of transmission of HIV but also for assessing the social and economic support available to people with HIV. Support issues are especially important among impoverished urban populations. Understanding social network composition is also critical for developing and sustaining appropriate HIV prevention and care programs. In these analyses we were specifically interested in examining the sources and functions of social support within participants' social networks, the sexual risk behaviors participants engaged in with network members, and the overlap between social support networks and sexual networks. We anticipated that MSMO would report more dense social networks than MSMW but less social support.

METHODS

The Unity in Diversity (UND) study was a culturally tailored pilot randomized clinical trial of a behavioral HIV prevention intervention for at-risk African American MSM in Baltimore from 2006 through 2009. Highly trained study staff recruited 2 types of participants: primary and secondary. Primary participants were directly recruited by the

study; secondary participants were those recruited by primary participants. Primary participants were recruited through street and venue-based outreach by trained field recruiters, word of mouth, advertisements in local papers, and active Internet-based recruitment on Web sites and chat rooms for African American MSM. Primary participant inclusion criteria were (1) aged 18 years or older, (2) identified as a male, (3) self-reported Black or African American race/ethnicity, (4) reported having had at least 2 sexual partners in the prior 3 months (at least 1 of whom must have been a male), (5) reported unprotected anal intercourse with a male in the prior 3 months, (6) was willing to take an HIV test if HIV status was negative or unknown, or to provide documentation of HIV-positive status, and (7) was willing to identify social network members and recruit them into the study.

We screened potential primary participants in a community-based research clinic setting using audio computer-assisted self-interview methods. Eligible primary participants who provided written informed consent were enrolled in the study and completed a baseline survey using the same methods. A trained interviewer administered a social network inventory (as described in the Measures section) and a risk survey face to face. At the end of the baseline visit, we asked primary participants to invite their social network members into the study. Inclusion criteria for secondary participants included (1) aged 18 years or older and (2) verification that they were invited to participate by a primary participant. Secondary participants who were enrolled in the study completed the same base-line procedures as the primary participants.

Of the 959 men screened for the study, 46% were screened ineligible. The majority of ineligibles were those men who answered “no” to the question “UND is a research study to improve the sexual health of African-American men who have sex with men. Does this apply to you?” A total of 261 men enrolled in the study. Of these, 188 (72.0%) were primary participants, and 73 (28.0%) were secondary participants.

Participants received $40 for completing the baseline assessments, and primary participants were given an additional $10 for the time and effort required to recruit secondary participants.

Measures

Outcome—The primary outcome was the difference between network factors of MSMO and network factors of MSMW. In addition to reporting male partners, MSMW were defined as reporting any female sexual partners in the prior 3 months in the main survey or reporting a female sexual network member in the prior 90 days on the social network inventory. Those who only reported male sexual partners or transgender partners (direction of gender change was not specified on the survey) were categorized as MSMO.

Social network inventory—This measure was a modified version of a previously used social support and drug network inventory.[38] The social network inventory contained 14 name-generator questions. The name generators asked participants to list individuals who provided specific types of functional social support to them. Different name generators elicited different domains of social support. Emotional support was assessed with this name generator: “During the last 3 months, who did you talk to about things that were personal and private or who did you get advice from?” Members of the material or financial support network were elicited with the question “During the last 3 months, who loaned or gave you some money?” The socializing support network was assessed with the question “During the last 3 months, who did you get together to hang out with or socialize?” Participants were also asked to list members of their sexual network, which was assessed by asking participants to list the individuals with whom they had had sex in the past 3 months. After participants listed their sexual partners, they were asked if they considered the partner to be

a main, casual, or exchange partner (sexual partners who exchange sex for money or valuable goods). The total size of the network was the sum of the number of unique individuals listed.

Once the network had been elicited, we asked participants about a variety of characteristics of the listed network members, such as their age, gender, and role relationship (e.g., kin or friend). To measure concurrency of sexual partnerships, participants provided the dates of the first sexual episode and the most recent sexual episode with each sexual partner listed. Overlap of these dates indicated concurrency. To assess condom use with sexual partners listed on the social network inventory we asked, "What best describes your condom use with [partner]?" There were 4 response categories: "never use condoms," "used condoms when we first started having sex but no longer use them," "use condoms every now and then," and "always use condoms with this partner for all types of sex." We dichotomized these responses into "always" and "less than always."

We assessed density of the social networks, a measure of interconnectedness of network members, by asking participants which network members knew other network members. We measured standard nondirected binary network density scores as the total number of network members who knew each other divided by the maximum possible number of network members who knew each other.[24] Density scores may range from 0 (indicating that no network members knew other network members) to 1(indicating that all network members knew each other). We also assessed the density of the sexual network as the proportion of sexual network members who knew each other. We defined kin relationship as any family member, such as parent, child, or sibling. Nonkin relationships included friends, acquaintances, godparents, and neighbors. Sexual partners were a separate category.

Sociodemographic characteristics—These characteristics included age, education, current employment status, and sexual identity.

HIV serostatus—All participants who self-reported negative or unknown serostatus provided an oral specimen that we tested by using Oraquick rapid HIV antibody testing kits. Preliminary positive results were confirmed by using Western blot assay. Participants who self-reported HIV-positive serostatus were asked to provide written documentation (such as medications or clinical test results) for validation, or they provided an oral specimen for HIV antibody testing. HIV-seropositivity was defined as participants testing positive by confirmatory tests or providing documentation of HIV-positive test results.

Data Analysis

The analyses for this study were restricted to UND study participants self-identified as African American males (n=234; 90% of total sample). The majority of the sample for the current study (80.3%) were primary participants. We calculated frequency distributions to examine the distribution of the variables and to generate a profile of sample characteristics among all participants, MSMW and MSMO. The outcome of interest was differences in network characteristics of MSMW versus MSMO. We used bivariate and multivariate logistic regression models with generalized estimating equations to assess differences in network characteristics. Variables with a *P* value of less than .2 in the bivariate models were entered into multivariate models. We generated 4 multivariate models to compare network characteristics between MSMW and MSMO, including material and emotional support, network members knowing participants' MSM status, partner relationships, and risk networks. We checked variance inflation factor to determine the potential multicollinearity among the independent variables. Independent variables with a variance inflation factor of

greater than 4.0 were dropped in the final model. We used Stata version 10.0 (StataCorp LP, College Station, TX) to perform all analyses.

RESULTS

About two thirds of participants (66.2%) were MSMO, and one third (33.8%) were MSMW. More than half of participants (58.1%) identified themselves as "homosexual, gay or same-gender loving," less than one third (31.6%) identified themselves as "bisexual," and 7.3% considered themselves "straight."

Table 1 presents sample characteristics and comparisons of sociodemographic and social network characteristics between MSMW and MSMO. Less than half of the sample had a college degree (bachelor's, associate's, or technical) (42.3%), less than one third were employed full or part time (27.8%), and almost half (44.9%) tested HIV positive or provided documentation of HIV-positive test results. MSMO were significantly more likely to be HIV positive than MSMW (52.3% vs 30.4%). There were no differences in size of total network, network density, number of kin, or number of network members providing emotional or material support. MSMW were older (42 vs 36 years) and less educated. Compared with MSMO, MSMW reported fewer network members with whom they socialized, fewer male network members, and more female network members.

Compared with MSMO, MSMW reported more sexual partners, fewer male partners, more exchange partners, and more partners that they always used condoms with. In both groups, the percentage of sexual partners providing material support (14% for MSMO vs 16% for MSMW) or emotional support (15% for MSMO vs 20% for MSMW) was small. MSMW had more sexual partners who provided material support and more sexual partners whom they saw at least once a week, although these differences were not statistically significant.

Tables 2, 3, and 4 present the results of multivariate models of differences in participant and network characteristics between MSMW and MSMO. The models examined the social support provided by network members (Table 2), sexual partner relationships (Table 3), and sexual risk networks as predictors of being MSMW versus being MSMO (Table 4). In the model of network social support (Table 2), for MSMW there was an independent and statistically significant association with being older, having decreased odds of HIV-positive status, and having attained higher education. MSMW were also associated with greater odds of reporting a higher number of female network members and a lower number of male network members (Table 2).

In the model of partner relationship (Table 3), reporting interacting with a greater number of sexual partners at least once a week was associated with higher odds of being MSMW than of being MSMO. Finally, in the model of risk networks (Table 4), reporting more male sexual partners was associated with lower odds of being MSMW than of being MSMO. Reporting concurrent partners, moreexchange partners, and more partners with whom one always used condoms were associated with higher odds of being MSMW than of being MSMO.

DISCUSSION

We used network analysis to examine differences in support and sexual network characteristics between African American MSMW and MSMO. Findings from the multiple logistic regression models revealed some differences between MSMW and MSMO in the number of social support network members by gender, role, and type of support function. Both groups reported that about one third of their close support network members were kin.

Our findings suggest that the African American MSMW and MSMO in our sample had diverse but relatively similar network configurations. Consequently, intervention developers should consider this diversity of sexual behaviors and social relationships when developing HIV prevention interventions. These interventions should capitalize on the range of social network relationships beyond sexual partners, such as kin, friends, and other social network members.

Some significant differences were reported in sexual network characteristics between MSMW and MSMO. Not only did MSMW report more sexual partners; they also tended to see more partners at least once a week. Having concurrent partners in their networks and a larger number of exchange partners were independently and significantly associated with being MSMW, as was always using condoms with sexual partners listed in the network inventory.

Interestingly, the majority of sexual partners were not reported as members of participants' emotional or material support networks. This finding suggests that many sexual partners are not perceived to be key sources of emotional or material support. Consequently, African American MSMW and MSMO may be receptive to the introduction of condom use because of the informal nature of these relationships; however, the relative weakness of these social ties may also make it more difficult to establish norms of communication regarding risk reduction and support for HIV medical care. In the current study, MSMW had significantly lower rates of HIV than did MSMO, yet MSMW reported more concurrent partnerships. These findings support previous research suggesting that the rate of HIV or sexually transmitted diseases among sexual network members is a key factor determining transmission.[39]

Although HIV rates were much higher among MSMO than they were among MSMW, HIV rates were exceedingly high in both groups– 52.3%and 30.4% respectively. Given the levels of reported concurrent partnerships among MSMW found in this study and elsewhere,[40] there is a need to develop HIV prevention interventions for African American MSMO and MSMW and their male and female sexual partners.

The high rates of sexual risk behaviors that we discovered are cause for concern. Although these findings may be attributable in part to the study selection criteria of having had at least 2 sexual partners in the past 3 months, a previous study of MSM in Baltimore aged 15 to 29 years found that the median number of lifetime male sexual partners was 10,[41] and the proportion of African American MSM who reported female partners in the current study was similar to what has been found in other studies.[31]

Limitations

There are limitations to our findings. In addition to the selection criteria, these findings are limited by the study's sampling procedures, self-reported data, and cross-sectional study design. We do not know if these findings generalize to African American MSMO and MSMW who did not volunteer for the study.

Because this study did not use random sampling, it is possible that the differences between MSMW and MSMO may be attributable in part to the recruitment strategy. Given the study limitations, it would be important to examine social network differences between MSMW and MSMO in other samples. Moreover, as this was an exploratory study, the numerous statistical comparisons between the 2 groups may have led us to find significant statistical associations that were attributable to chance. Social networks are not static; hence, it would be valuable to examine how these men's social networks change over time. It would be also valuable to identify social network factors that help facilitate positive physical and mental

health. Our study did not examine sociometric network composition; sociometric data may provide greater insights into the dynamics of HIV transmission and how to develop more effective social network–based interventions.

Conclusions

Given the high proportion of MSMW among African American MSM,[5] future interventions need to focus on African American MSMW. MSMW may be harder to access than other MSM because of their smaller MSM networks, so special attention is warranted to recruit MSMW for HIV prevention interventions. Interventions also need to take into account the high levels of unemployment and underemployment among African American MSMW and MSMO that may lead these populations to make HIV prevention a lower priority than acquiring economic resources. Although other urban minorities are also subject to economic deprivation and often must rely on network members for economic and social support, African American MSMW and MSMO must contend with the double stigma of sexual orientation and, for many, HIV infection. These conditions suggest the importance of tailoring HIV testing, prevention, and medical care programs to the unique needs of African American MSMW and MSMO and their risk partners.

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TABLE 1

Sample Characteristics and Unadjusted Analysis of African American Men Who Have Sex With Men: Baltimore, Maryland, 2006–2009

Characteristics	Total, No. (%) or Mean ±SD (n = 234)	MSMO, No. (%) or Mean ±SD (n = 155)	MSMW, No. (%) or Mean ±SD (n = 79)	Unadjusted OR (95% CI)	*P*
College degree (bachelor's, associate's, or technical)	99 (42.3)	81 (52.3)	18 (22.8)	0.27 (0.15, 0.50)	< .001
Employed (part/full time)	65 (27.8)	46 (29.7)	19 (24.1)	0.75 (0.40, 1.42)	.38
Annual income > $10 000	110 (47.0)	78 (50.3)	32 (41.5)	0.67 (0.38, 1.20)	.18
HIV positive (Oraquick result or documented status)	105 (44.9)	81 (52.3)	24 (30.4)	0.40 (0.22, 0.73)	.003
Having any concurrent partners in the network	124 (53.0)	74 (47.7)	50 (63.3)	1.89 (1.04, 3.40)	.004
Age, y	38 ± 10.59	36 ± 11.20	42 ± 8.16	1.06 (1.03, 1.09)	< .001
Network size	8.38 ± 4.30	8.68 ± 4.70	7.77 ± 3.33	0.95 (0.89, 1.01)	.09
Kin	2.11 ± 2.04	2.10 ± 2.02	2.11 ± 2.08	1.00 (0.88, 1.15)	.97
Nonkin	4.54 ± 3.45	4.79 ± 3.74	4.03 ± 2.76	0.93 (0.86, 1.01)	.09
Network members providing support					
Emotional	1.94 ± 1.64	2.08 ± 1.73	1.65 ± 1.41	0.83 (0.67, 1.04)	.1
Material	1.27 ± 1.09	1.30 ± 1.13	1.22 ± 1.00	0.93 (0.23, 1.19)	.54
Network members socialized with	2.62 ± 2.49	2.88 ± 2.76	2.11 ± 1.73	0.84 (0.74, 0.98)	.03
Male network members	5.46 ± 3.25	5.98 ± 3.52	4.43 ± 2.34	0.83 (0.76, 0.92)	< .001
Female network members	2.92 ± 2.09	2.70 ± 2.10	3.34 ± 2.01	1.15 (1.02, 1.31)	.03
Network density	0.42 ± 0.26	0.44 ± 0.26	0.40 ± 0.28	0.56 (0.18, 1.71)	.36
Sexual partners	3.01 ± 1.77	2.79 ± 1.74	3.44 ± 1.75	1.23 (1.06, 1.43)	.007
Men	2.40 ±1.73	2.70 ± 1.76	1.80 ± 1.51	0.69 (0.56, 0.85)	< .001
Women	0.48 ± 0.95	0	1.43 ± 1.13	…	…
Transgender sexual partners	0.13 ± 0.47	0.08 ± 0.38	0.22 ± 0.61	1.74 (0.96, 3.17)	.07
Exchange partners	0.45 ± 1.11	0.25 ± 0.73	0.84 ± 1.55	1.67 (1.21, 2.29)	.002
Sexual partners providing support					
Material	0.35 ± 0.62	0.30 ± 0.50	0.44 ± 0.80	1.46 (0.97, 2.19)	.07
Emotional	0.41 ± 0.59	0.38 ± 0.56	0.48 ± 0.64	1.33 (0.83, 2.12)	.23
Sexual partners seen at least once/wk	1.46 ± 1.27	1.26 ± 1.01	1.86 ± 1.62	1.45 (1.18, 1.80)	.001
Sexual network density	0.23 ± 0.32	0.20 ± 0.28	0.28 ± 0.38	2.16 (0.94, 4.97)	.07
Partners with whom condoms are always used	1.11 ± 1.34	0.92 ± 1.23	1.48 ± 1.48	1.35 (1.09, 1.67)	.005
Men	0.85 ± 1.19	0.90 ± 1.20	0.77 ± 1.17	0.91 (0.72, 1.16)	.45

Am J Public Health. Author manuscript; available in PMC 2012 October 14.

Characteristics	Total, No. (%) or Mean ±SD (n = 234)	MSMO, No. (%) or Mean ±SD (n = 155)	MSMW, No. (%) or Mean ±SD (n = 79)	Unadjusted OR (95% CI)	*P*
Women	0.21 ± 0.58	0	0.61 ± 0.87	…	…

Note. CI = confidence interval; MSMO= men who have sex with men only; MSMW= men who have sex with men and women; OR = odds ratio. Ellipses indicate variables not included in the adjusted model.

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TABLE 2

Bivariate and Multivariate Comparisons of Characteristics of Social Support Networks of African American MSMW versus MSMO: Baltimore, MD, 2006–2009

Network Characteristics	OR (95% CI)	*P*	AOR (95% CI)	*P*
Age	1.06 (1.03, 1.09)	< .001	1.07 (1.04, 1.10)	< .001
College degree (bachelor's, associate's, or technical degree)	0.27 (0.15, 0.50)	< .001	0.30 (0.15, 0.59)	.001
HIV positive	0.40 (0.22, 0.73)	.003	0.29 (0.15, 0.59)	.001
No. of network members providing support				
Emotional	0.83 (0.67, 1.04)	.1	0.91 (0.79, 1.14)	.55
Material	0.93 (0.23, 1.19)	.54	…	
No. of network members socialize with	0.84 (0.74, 0.98)	.03	0.95 (0.79, 1.14)	.59
No. of male network members	0.83 (0.76, 0.92)	< .001	0.86 (0.76, 0.98)	.024
No. of female network members	1.15 (1.02, 1.31)	.03	1.31 (1.09, 1.58)	.004
No. of kin	1.00 (0.88, 1.15)	.97	…	
No. of nonkin	0.93 (0.86, 1.01)	.09	…	
Network density	0.56 (0.18, 1.71)	.36	…	
Sexual network density	2.16 (0.94, 4.97)	.07	1.48 (0.53, 4.09)	.45

Note. AOR = adjusted odds ratio; CI = confidence interval; MSMO= men who have sex with men only; MSMW = men who have sex with men and women; OR = odds ratio. Sample size was n = 234. Ellipses indicate variables not included in the adjusted model.

TABLE 3

Bivariate and Multivariate Comparisons of Partner Relationships of African American MSMW Versus MSMO: Baltimore, MD, 2006–2009

Network Characteristics	OR (95% CI)	*P*	AOR (95% CI)	*P*
Age	1.06 (1.03, 1.09)	< .001	1.08 (1.04, 1.11)	< .001
College degree (bachelor's, associate's, or technical degree)	0.27 (0.15, 0.50)	< .001	0.20 (0.09, 0.40)	< .001
HIV positive	0.40 (0.22, 0.73)	.003	0.25 (0.12, 0.52)	< .001
No. of sexual partners providing support				
Material	1.46 (0.97, 2.19)	.07	1.22 (0.72, 2.05)	.44
Emotional	1.33 (0.83, 2.12)	.23	…	…
No. of sexual partners seen at least once/wk	1.45 (1.18, 1.80)	.001	1.48 (1.12, 1.96)	.005
Total no. of sexual partners	1.23 (1.06, 0.43)	.007	1.14 (0.95, 1.36)	.15

Note. AOR = adjusted odds ratio; CI = confidence interval; MSMO = men who have sex with men only; MSMW = men who have sex with men and women; OR = odds ratio. Sample size was n = 234. Ellipses indicate variables not included in the adjusted model.

TABLE 4

Bivariate and Multivariate Comparisons of Sexual Risk Networks of African American MSMW Versus MSMO: Baltimore, MD, 2006–2009

Network Characteristics	OR (95% CI)	*P*	AOR (95% CI)	*P*
Age	1.06 (1.03, 1.09)	< .001	1.06 (1.02, 1.09)	.001
College degree (bachelor's, associate's, or technical degree)	0.27 (0.15, 0.50)	< .001	0.28 (0.13, 0.62)	.002
HIV positive	0.40 (0.22, 0.73)	.003	0.25 (0.12, 0.51)	< .001
Total no. of sexual partners	1.23 (1.06, 1.43)	.23	…	
No. of male partners	0.69 (0.56, 0.85)	< .001	0.41 (0.26, 0.63)	< .001
Having concurrent partners in the network	1.89 (1.04, 3.40)	.04	3.59 (1.35, 9.52)	.01
No. of exchange partners	1.67 (1.21, 2.29)	.002	2.23 (1.53, 3.25)	< .001
Condom use with sexual partners	1.35 (1.09, 1.66)	.005	1.85 (1.31, 2.62)	< .001

Note. AOR = adjusted odds ratio; CI = confidence interval; MSMO = men who have sex with men only; MSMW = men who have sex with men and women; OR = odds ratio. Sample size was n = 234. Ellipsis indicates a variable not included in the adjusted model.